Welcome Back! Definition of a Measurement Measurement System Stages **Engineering Example** 

#### Module 1 - Introduction

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering Tennessee Technological University

**Topic 1 - General Measurement System** 

#### **Topic 1 - General Measurement System**

- Welcome Back!
- Definition of a Measurement
- Measurement System Stages
- Examples in Mechanical Engineering

#### Welcome to New Video Topics

#### Welcome Back!

- Things are going to be different but we will still learn!
- These new outlines should help keep me/us on track.
- ullet The material will be organized in  $\sim$  10 min videos, and you can watch them at anytime.

#### Definition of a Measurement

"A measurement is an act of assigning a specific value to a physical variable."

Text: Theory and Design of Mech. Meas.

# Measurement System Stages

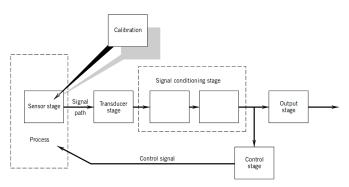
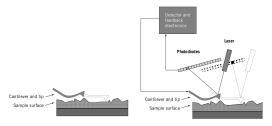


Figure 1.5 Components of a general measurement system.

Image: Theory and Design of Mech. Meas.

# Sensor-Transducer Stage

a sensor, a physical element that employs some natural phenomenon... ...to sense the variable being measured

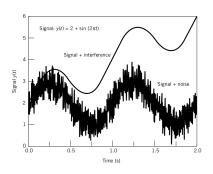


A transducer converts the sensed information into a detectable signal

Text, Image: Theory and Design of Mech. Meas.

# Signal Conditioning Stage

#### What is the the definition of signal?



- Filtering
- Amplification
- Attenuation
- Excitation
- Linearization
- Electrical Isolation
- Surge Protection

Image: Theory and Design of Mech. Meas.

### Output Stage

The output stage indicates or records the value measured. This might be a simple readout display, a marked scale, or even a recording device such as a computer disk drive.

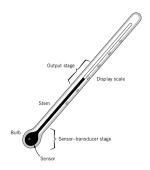




Image: Theory and Design of Mech. Meas.

### **Engineering Example**

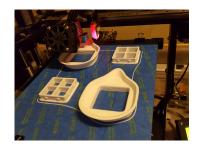


Image: T.Hill

3D printers (FDM) use PLA, ABS, PETG and other plastics which absorb moisture from the air over time causing adverse affects on part quality. This is particularly a problem in humid climates such the southeastern USA.

#### **Engineering Example**



Fortunately the *water-logged* plastic can be dehydrated for further use.

Inspect the DIY filament dryer shown and Identify each of the following measurement stages.

- Sensor Transducer
- Signal Condtioning
- Output Stage
- Feedback Control ?